DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 4 it is believed that λ should be λ_1 because the claim concerns the first information layer. The language should parallel that of claim 3.

2. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is believed that "n" should be "n_1" since the claim is referring to the thickness of the first information layer.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2 and 6-9 rejected under 35 U.S.C. 102(b) as being anticipated by Nee et al. US 2002/0122913 as evidenced by Super Audio Compact Disc (copyright 1997) and Wang et al. 2003/0137923.

Nee et al. teaches an optical disc comprising a transparent substrate having a thickness of 0.6mm and 12 cm diameter with CD-type of information pits

injection molded thereon, a highly reflective layer of a copper based alloy having a thickness of 85 nm. Another transparent substrate having a thickness of 0.6 mm and 12 cm in diameter having Super Audio type information formed thereon by injection molding is coated with a semi reflective thin film of a copper alloy. The copper alloy contains silver and therefore meets the limitation of instant claim 9. The two discs are bonded together and an organic resin layer was spin coated on top of the copper alloy film and cured. In the finished disc a 650 nm laser beam will play back the high density SACD layer through about 0.6 mm thickness of clear substrate and a 780 nm laser beam will play back the conventional CD layer through about 1.2 mm thickness of clear substrate(0086).

In another example Nee forms a single layer optical recording medium comprising a polycarbonate disc having a thickness of 0.6 mm and having pre-grooves suitable for DVD-R formed thereon. A cyanine dye was spin-coated on to the substrate to form a recording layer and a silver alloy based reflective layer was sputtered onto the cyanine dye recording layer(0091).

Nee is concerned with concerned with providing silver-alloy reflective and semi-reflective layers for optical discs. These alloys have relatively high reflectivity and high corrosion resistance(abstract). Organic dyes such as cyanines, phthalocyanines, and azo-dyes can corrode reflective layers and gold is often used for this reason. Gold is expensive. The alloys of this invention offer an alternative to gold(0014)

It is the position of the examiner that the dual-layer optical recording medium taught at (0086) has a organic dye recording layer wherein the organic

dye is one of cyanines, phthalocyanines or azo-dyes based on the disclosure at (2/58-3/3) and based on the formation of a single layer optical recording medium comprising a cyanine dye recording layer at (0091). A dual-layer optical recording medium has a greater recording capacity than a single-layer medium.

On page 10 of Super Audio Compact Disc (copyright 1997), a hybrid disc comprising a Super Audio CD layer and CD Red-Book compatible layer is taught. This medium also comprises a standard reflective layer and a semi-transmissive layer. The track pitch of the Super Audio layer is 0.74 micrometers and the track pitch of the CD Red-Book compatible layer is 1.6 micrometers. The Super Audio CD layer is recorded using a laser having a wavelength of 650 nm and the CD Red-Book compatible layer is recorded using a laser having a wavelength of 780 nm.

It is the position of the examiner that the Super audio CD layer formed by Nee also has a track pitch of 0.74 micrometers. Wang et al. teaches that a conventional DVD-R has a track pitch of about 0.74 micrometers(0006).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-2 and 6-9 rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiwagi et al. JP-11-120617(English language translation provided).

In figure 1 an optical recording medium comprising an HD format layer 1, a DVD format layer 2 and a CD format layer 3 is taught. The DVD board(substrate) 14 and the CD board(substrate) 15 are formed by injection molding. The thickness of the CD substrate 15 is 0.55 mm and the thickness of the DVD substrate 14 is 0.6 mm. A semi transparent layer of a SiN, SiO, or SiC or mixtures of these is formed between the HD layer and the DVD layer. A semi-transparent layer is also needed between the DVD layer and the CD layer. A fully reflective film of Au, Ag, or Cu is formed in the CD layer. The fully reflective layer should have a reflectivity of not less than 70% to a laser having a wavelength of 780 nm(0035-0041).

Based on this disclosure it is the position of the examiner that the CD layer can be recorded using a laser having a wavelength of 780 nm.

Use of an organic coloring matter system as the recording material is taught at (0012).

The reflectance of the DVD format layer to a laser having a wavelength in the range of 630-680nm is not less than 15% and not less than 70% transparent to a laser having a wavelength of 780 nm (0020). This meets the limitation of claim 3 which requires that the DVD layer have a reflectance to the wavelength used to record it that is greater than or

equal to 15%. This also meets the limitation of claim 3 that the transmittance of the DVD with respect to the laser used to record the CD layer T2 is greater than or equal to 76%.

It is the position of the examiner that the DVD layer including an organic dye material must be semi-transparent in order for recording in the CD layer to be feasible.

The embodiment of figure 6 shows an embodiment wherein a DVD layer 2 and a CD layer 3 are accessed from one side of a medium and a high density layer is accessed from the opposite side (0032).

It is the position of the examiner that in this embodiment the CD layer is accessed using a laser having a wavelength of 780 nm and the DVD layer is accessed using a laser having a wavelength of between 630-680 nm.

It would have been obvious to one of ordinary skill in the art to modify the medium of example 1 by adding an organic coloring matter layer based on the disclosure at (0012) to allow the medium to be user recorded.

7. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiwagi et al. JP-11120617(English language translation) as applied above and further in view of Shibata et al. US 6,338,889 and Tsai et al. US 2003/0031955.

Kashiwagi et al. teaches a medium wherein the DVD layer exhibits a reflectivity of 15% or greater to the laser used to record it and exhibits a

transmittance of 70% or more to the laser used to record the CD layer. This meets the limitation of claim 3.

Claim 3 also requires that the thickness of the recording layer in the first information layer have a thickness of about 40-203 nm(where λ_1 is 650 nm and n_1 is 2). Claim 3 requires a groove depth of 50 to 180 nm(where λ is 650 nm). Claim 5 requires the thickness of the recording layer to be about 73 to 122 nm(where n is 2.0).

Shibata et al. teaches that the pre-groove for a DVD-R substrate preferable has a track pitch of 0.3 to 0.9 micrometers(more preferably 0.4 to 0.8 micrometers) and a depth of 50 to 250 nm(more preferably 80 to 220 nm further preferably 100 to 200 nm)(5/1-7). A dye recording layer is provided on the pre-groove. Preferred dyes include cyanines and phthalocyanines. Cyanines are a more preferred dye type(5/25-30). The recording layer generally has a thickness of 20 to 500 nm preferably 50 to 300nm(5/30-32).

Tsai et al. teaches that cyanine dyes have a refractive index between 1.6 to 4.0 and an extinction coefficient of 0.01 to 0.45(0005).

It would have been obvious to modify the optical recording medium taught by Kashiwagi et al at (0036-0041) by forming the recording layer of the HD,DVD, and CD format layers of a cyanine dye based on the disclosure to use dyes as an alternative to the phase-change material used in the example in Kashiwagi at (0012). Further it would have been obvious to form at least the DVD format layer so that the depth of the pre-

groove formed on the substrate are in the range of 50 to 250 nm and so that the thickness of the dye recording layer is in the range of 50 to 300 nm based on the disclosure of Shibata et al. and with the reasonable expectation of success.

The embodiment of figure 6 taught by Kashiwagi shows an embodiment wherein a DVD layer 2 and a CD layer 3 are accessed from one side of a medium and a high density layer is accessed from the opposite side (0032).

It is the position of the examiner that in this embodiment the CD layer is accessed using a laser having a wavelength of 780 nm and the DVD layer is accessed using a laser having a wavelength of between 630-680 nm.

It would have been obvious to one of ordinary skill in the to modify the embodiment of example 6 by forming the recording layer of an organic coloring matter material such as a cyanine dye based on the disclosure at (0012) of Kashiwagi. Further it would have been obvious to form the pre-groove of the DVD layer to have a depth of 50 to 250 nm and to form the cyanine dye recording layer to have a thickness in the range of 50-300 nm based on the disclosure in Shibata et al. at (5/1-5) and (5/27-32).

8. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nee et al. US 2002/0122913 as evidenced by Super Audio Compact Disc and Wang et al. 2003/0137923 as applied above and further in view of Shibata et al. US 6,338,889 and Tsai et al. US 2003/0031955.

Shibata et al. teaches that the pre-groove for a DVD-R substrate preferable has a track pitch of 0.3 to 0.9 micrometers(more preferably 0.4 to 0.8 micrometers) and a depth of 50 to 250 nm(more preferably 80 to 220 nm further preferably 100 to 200 nm)(5/1-7). A dye recording layer is provided on the pre-groove. Preferred dyes include cyanines and phthalocyanines. Cyanines are a more preferred dye type(5/25-30). The recording layer generally has a thickness of 20 to 500 nm preferably 50 to 300nm(5/30-32).

Tsai et al. teaches that cyanine dyes have a refractive index between 1.6 to 4.0 and an extinction coefficient of 0.01 to 0.45(0005).

It would have been obvious to one of ordinary skill in the art to modify the dual layer optical recording medium taught by Nee et al. at (0086) by forming the grooves in the Super Audio CD layer to have groove depth in the range of 50 to 250 nm based on the disclosure in Shibata et al. at (5/1-3) and based on the use of pre-grooves having a track pitch of 0.74 micrometers which have been shown to be equal to the track-pitch used in a DVD-R type disc. Further, it would have been obvious to one of ordinary skill in the art to form a cyanine dye recording layer having a

thickness of between 50 to 300 nm on the Super Audio substrate based on the disclosure in Shibata et al at 5/30-32.

It is the position of the examiner that a recording layer formed to these specifications will meet the transmittance and reflectance limitations recited in claim 3. Reflectance and transmittance of the recording layer is dependent on the refractive index of the dye and the thickness of the recording layer.

9. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukagoshi et al. EP-1 162 614 in view of Shibata et al. US 6,338,889 and Tsai et al. US 2003/0031955.

Tsukagoshi et al. teaches an optical recording medium as shown in figure 1 comprising a polycarbonate disc having a thickness of 0.6 mm produced by injection molding with grooves having a width of 0.2 micrometers and a depth of 0.03 micrometers formed on one surface of the disc and at a track pitch of 0.74 micrometers(DVD). On the surface of this substrate a first dielectric layer, a phase change recording layer, and a second dielectric layer are formed. Next, a second polycarbonate substrate having a thickness of 0.6mm was produced by injection molding with grooves having a depth of 0.4 micrometers and a pitch of 1.6 micrometers(CD). On this substrate a dielectric layer, a phase change recording layer and a second dielectric layer were formed. DL-1 and DL-2 were separated by a filter layer. The filter layer exhibited an absorption of 96% at a wavelength of 660 nm and 15%(transmittance of 85%) at a

wavelength of 780 nm(0129-0134). An organic dye may be used in place of the phase change recording material as the data layer material(0091). See also disclosure at (0009). The filter layer exhibits a high absorption for the laser wavelength used for recording the layer nearest the light incidence plane. Materials for the filter layer including metals, dye polymer, dielectric-multi-layer films etc are disclosed at (0034-0049). The filter layer corresponds to applicant's additional semi-transparent reflector layer recited in instant claim 9.

Shibata et al. teaches that the pre-groove for a DVD-R substrate preferable has a track pitch of 0.3 to 0.9 micrometers(more preferably 0.4 to 0.8 micrometers) and a depth of 50 to 250 nm(more preferably 80 to 220 nm further preferably 100 to 200 nm)(5/1-7). A dye recording layer is provided on the pre-groove. Preferred dyes include cyanines and phthalocyanines. Cyanines are a more preferred dye type(5/25-30). The recording layer generally has a thickness of 20 to 500 nm preferably 50 to 300nm(5/30-32).

Tsai et al. teaches that cyanine dyes have a refractive index between 1.6 to 4.0 and an extinction coefficient of 0.01 to 0.45(0005).

It would have been obvious to one of ordinary skill in the art to modify the medium disclosed in Tsukagoshi et al. at (0129-0134) by using an organic dye material instead of the phase change material as the material of the recording layer based on the disclosure in Tsukagoshi et al

at (0091) that an organic dye may be used in place of the phase change recording material as the data layer material.

Further it would have been obvious to form the pre-groove formed in the DVD substrate to have a thickness in the range of 50 to 250 nm based on the disclosure in Shibata et al. at (5/1-3) and based on the use of pre-grooves having a track pitch of 0.74 micrometers which have been shown to be equal to the track-pitch used in a DVD-R type disc. Further, it would have been obvious to one of ordinary skill in the art to use cyanine dye as the organic recording material and to form the recording layer to have a thickness of between 50 to 300 nm on the DVD-R substrate based on the disclosure in Shibata et al at 5/30-32 and with the reasonable expectation of success.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNA L. VERDERAME whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Examiner, Art Unit 1795

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